SCIENCE, AFTER SACRIFICE OF LIFE AND TENDER OF OTHER LIVES, ACCEPTS THEORY OF MOSQUITOES' RESPONSIBILITY FOR YELLOW FEVER SPREAD

A CHOICE BREEDING PLACE FOR COMMON MOSQUITOES, NORTHWEST OF DELMAR GARDEN.

Of All the Various Species of the Winged Pest the Stegomyia Fasciata Alone Transmits the Germs of the Dread Disease—Scientists Do Not Believe This Species Exists in St. Louis, and, While the Malady May Develop Here, Infection Occurs Further South—Although They Breed With Marvelous Rapidity, It Is Possible to Exterminate Them and Thus Abate the Evils They Carry—What Other Cities Have Done.

To the agency of one species of mosquito—the stegomyia fasciata is its scientific name—science has agreed is due the inoculation of persons with the dread yellow fever germs and the transmission of the disease. But it was not without a heroic sacrific of life by one physician committed to this theory and the voluntary offer of other lives in the cause that the medical world accepted it.

To the ordinary observer all mosquitoes look alike, and yet they are vastly different, and there is nothing more important than that those interested in practical work of exterminating should be able to recognize the common species. To determine this it is necessary to have a hand lens that magnifies three or four diameters, while the insect must be dry and not too badly mashed.

First of all, if the mosquito has spotted wings, long legs and slender body it belongs to the genus anopheles or malaria carriers. If it is moderate size, with, usually, unspotted wings, it is a culex. The species of the culex are classified by the bandings of the beak, the legs and the abdomen. If these are carefully regarded the common forms are readily recognizable.

The stegomyia fasciata, the yellow-fever mosquito, is a handsome insect. The banded legs and the conspicuous silver stripes upon its thorax and abdomen render it readily recognizable.

ST. LOUIS IN NO DANGER.

Physicians and scientists say that St. Louis is not in danger of an epidemic of yellow fever, which is now raging in New Orleans and in other Southern points. They all agree that persons coming from the fever-stricken district may develop the disease in St. Louis, but that infection took place before leaving the South, and that infection in St. Louis is not probable.

Through experiments of Major Walter Reed, Surgeon Lazear and others of the United States Army in Cuba, it has been discovered that yellow fever is transmitted only by the stegomyia fasciata species of mosquito, and not by fomites, which was the accepted theory of contagion prior to the investigations, and which caused people to leave the South by the hundreds in 1878.

It is the popular belief among scientists and physicians that this species of mosquito does not exist in St. Louis, though it may possibly be found in this vicinity, as F. V. Theobald, an expert and an authority on the subject, says that it is to be found north and south of the equator to 28 degrees north and south latitude.

O. L. Howard of the Department of Agriculture states that he found this species as far north as Hot Springs, Ark., and Virginia Beach.

During the World's Fair the gentleman who had charge of the mosquito exhibit from Cuba stated that he found several of the yellow-fever breeding mosquitoes in the World's Fair grounds. Assuming this report to be correct, Doctor William Trelease of the Missouri Botanical Garden was asked if the mosquito might not have been introduced in the Fair grounds through the shipments of fruits and building material from Cuba. Doctor Trelease said:

WATER THEIR BREEDING PLACES.

"That would be impossible. No mosquitoes of any kind are able to develop except in water. The mosquito deposits its eggs on the water and not on the vegetation. If the stegomyia fasciata was found in Forest Park, in all probability it is to be found along the river front and other places. It is possible that it does exist in this locality. No thorough means have been taken to ascertain the exact geographic range of this or any other species of mosquito. It is quite likely that a thorough collecting would show the existence of this species at a more northern locality."

Assuming that the species does exist in this vicinity, the health authorities will take every precaution to prevent yellow fever patients, if there should be any, from being bitten by any sort of mosquitoes. And they recommend that the citizens use means to prevent the mosquitoes from biting them, and to exercise care about standing water and to use means in exterminating them.

Had the health authorities of the South and the people observed the results of experiments of the Yellow Fever Commission of Havana, Cuba, results which, it is claimed, have enabled the authorities to make Havana, the home of yellow fever, practically immune after 150 years of constant fever, the present yellow fever epidemic in all probability would have been avoided. As it is, the unsanitar ycondition of the city, the absence of a sewerage system, the failure to put into operation a modern waterworks system furnishing filtered water, necessitating the retining of obsolete cisterns, and the presence everywhere of stagnant water, of filthy streets, gutters and yards, make it almost impossible to exterminate the stegomyia fasciata before frost comes. Nevertheless it is absolutely certain that the people of New Orleans and the South are aroused to the possibilities of making themselves immune to the attacks of the yellow fever, as New Jersey has practically rid herself of malaria by making a successful fight against Anopheles species, the malaria-carrying mosquito.

WHAT NEW JERSEY HAS DONE.

Doctor John B. Smith, who has made a study of the New Jersey mosquito and means of exterminating them, in his report February, 1904, says:

"No mosquitoes of any kind are able to develop except in water. It need not be much water, and it matters not whether it be clean or foul; but water there must be. If mosquitoes are found where no suitable breeding places exist it means that they have come from some other point. When we find mosquitoes arising in clouds from grasses or bushes among which we walk, it is because they find there a suitable hiding or resting place. It is impossible for any known mosquito larvae to develop on grasses or in the soil at their roots."

The "house" or "rain-barrel" mosquito is the most common and widely distributed species. It derives the name "house" mosquito from the fact that it is the species most commonly found indoors, and because it is in our cellars and outbuildings that it passes the winter.

All mosquitoes, so far as known, are rapid breeders. They pass through several generations in the course of a year, and hibernate in both the adult and larval stages. Overwintering mosquitoes may be found in cellars, in cold garrets, in barns, under lids of water tanks, under bridges and stone culverts. In the extreme Southern States many mosquitoes are active all the year, and in most tropical regions they breed all the year round. In dry tropical regions they breed only during the rainy season, and in the dry spell the species is perpetuated by the persistence of the adults, which either active, or more usually inactive or dormant, as though they were hibernating. In such dry spells the males generally die, and the gravid females live over. This is also the case in hibernation in the North.

THEIR MARVELOUS FECUNDITY.

The mosquitoes lay their eggs at night or very early in the morning, on the surface of the water, in masses containing anywhere from 50 to 400. If undisturbed, the female will deposit her entire stock in one boat, but if she is disturbed, she may make two or more boats. Under ordinary circumstances, they hatch the night after they are laid, or in about twenty-four hours. They then need but a week to attain full growth; less if the water be warm and full of food.

The question of how far mosquitoes can fly is an important one in the work of extermination. Ordinarily it is safe to say that the mosquito does not fly far. Where there is water favorable to egg-laying in the immediate vicinity of the place of their birth, and especially where there are warm-blooded animals upon which they can feed, they have no migratory incentive. Then, again, they are not strong flyers as insects go. The malaria mosquitoes seem much less capable of extended flight than the commoner mosquitoes.

That mosquitoes are carried by railroad trainse must be a matter of common observation to everyone who travels. A prominent St. Louis physician advanced the theory that, since the steamer traffic was a thing of the past, there would be no danger of bringing the fever-infected mosquitoes to this vicinity, stating that the appearance of the stegomyia fasciata in 1878 in St. Louis was due to the mosquitoes breeding in the damp places about the boats. The health authorities recognize, however, that this method of distribution is and has been a very important one, and have taken action toward disinfecting the cars to kill the mosquitos. It is an established fact that by means of railroad trains unlimited quantities of mosquitoes are carried unlimited distances and, on emerging from cars, start to breed even where mosquitoes are ordinarily rare. In this way the mountain resorts are said to get their share of lowland mosquitoes.

Mosquitoes will breed wherever a bit of water stands for ten days or longer. They breed in still water. They have been found breeding in broken bottles, in rain-filled hollows of apple and other trees, in flower vases on tables in houses, in old tin cans on the dumps, in closed sewers, old wells and in cisterns. In order to avoid the irritating punctures of the busy mosquito and to produce the condition of comfort which the absence of mosquitoes bring, no possible spot where water can accumulate should be overlooked. The smallest possible collections of stagnant rainwater become breeding places.

The principal cause of the recent widespread interest in mosquitoes and mosquito extermination is the perfectly satisfactory proof which has been gained in the past few years that they are responsible for the transmission of yellow fever and malaria.

BIRTH OF THE THEORY.

In 1881 Doctor Carlos Finlay of Havana, Cuba, noticed a correspondence between the abundance of mosquitoes and a period of increase of yellow fever in autumn, while in the summer mosquitoes were scarce and also yellow fever. This suggested to him the idea that the mosquito was responsible for the disease, and he conducted certain experiments which he claimed proved his theory.

The whole credit of the development of the theory into the scientific fact is due to Major Reed, who with other officers and privates of the United States Army risked their lives in the demonstration. Assistant Surgeon Lazear lost his life.

After the experiments of Doctor Lazear and Doctor Carrol, an experimental sanitary station was established in an open uninhabited field about one mile from the town of Quemados, Cuba, under the complete control of Major Reed. The station was named Camp Lazear, in honor of the brave physician who became a martyr to science for the benefit of his fellow-men.

A most careful series of experiments was carried on to see whether yellow fever could be conveyed by fomites—that is, by personal contact with clothes or belongings of yellow-fever patients. As was well known, the consensus of opinion, both of the medical profession and others, was in favor of the conveyance of yellow fever in this way. During the time when the fever is an epidemic in the Southern States everything was disinfected wherever a case of the fever was reported.

EXPERIMENT ESTABLISHES PROOF.

The experiment station was a small frame building, closely and carefully screened. The average temperature was kept at 82 degrees F. for a period of sixty days. Bedding of yellow-fever patients was placed in this house. For sixty-three days this building thus furnished was occupied by seven nonimmune persons. They wore the garments worn by yellow-fever patients throughout their entire attacks, making exclusive use of the soiled blankets and sheets. The attempt to thus infect the building and the seven nonimmune patients was a total failure. All seven were released from quarantine in excellent health.

Having disproved the theory that the fever was transmitted by fomites, the commission then erected another building, an exact duplicate of the first. All articles were thoroughly disinfected by steam. Mosquitoes which had been infected by biting yellow-fever patients were admitted to a large room of this building. Nonor more after biting yellow-fever patients before being allowed to sting the volunteers, 80 per cent were taken with the disease.

MAJOR REED'S CONCLUSIONS.

Major Reed made the following statement after this careful experiment:

"The mosquito, stegomyia fasciatus, immune persons were placed in both rooms. In the room in which the mosquitoes were not admitted the persons remained in perfect health. In the other room six out of seven persons bitten by the mosquitoes contracted yellow fever. In all, of persons bitten by infected mosquitoes that had been kept twelve days serves as the intermediate host for the parasites of yellow fever.

"Yellow fever is transmitted to the nonimmune person by means of the bite of the mosquito that has previously fed on the blood of those sick with the fever.

"An interval of about twelve days or more after contamination appears to be necessary before the mosquito is capable of conveying the infection.

"The bite of the mosquito at an earlier period after contamination does not appear to confer any immunity against a subsequent attack.

"Yellow fever can also be experimentally produced by the subcutaneous injection of blood taken from the general circulation during the first and second days of the disease.

"An attack of yellow fever, produced by the bite of the mosquito, confers immunity against subsequent injection of the blood of an individual suffering from the nonexperimental form of this disease.

"The period of incubation varies from forty-one hours to five days and seventeen hours.

"Yellow fever is not conveyed by fomites, hence disinfection of articles of clothing, bedding or merchandise, supposedly contaminated by contact with those sick with the disease, is unnecessary.

"A house may be said to be infected with yellow fever only when there are within its walls contaminated mosquitoes capable of conveying the parasite of the disease.

"Yellow fever can be most effectually controlled by measures directed to the destruction of mosquitoes and the protection of the sick against the bites of these insects.

"While the methods of propagation of yellow fever has now been definitely determined the specific cause of this disease remains to be discovered."

The yellow-fever mosquito has a wide range south of the Mason and Dixon line, and it probably occurs everywhere in what is termed the lower austral life zone, extending to some extent into the upper austral life zone. This fact, with the existence of mosquitoes in a given locality, does not mean that there is any danger in such localities of yellow fever unless one or more cases of the disease are brought into the locality and exposed in such a way as to give the mosquitoes an opportunity to suck their blood and fly away untrammeled to some healthy person.

UNIVERSAL ACTION EFFECTIVE.

Any effective crusade against the mosquito must be universal, yet it is possible for a limited area to keep itself freed despite the neglect of neighboring communities.

First, an effort should be made to destroy the hibernating mosquitoes in the cellars. This may be done by thorough fumigating. An absolutely effective remedy is the hydrocyanic acid gas, produced as follows, the amounts being given for 100 cubic feet of space.

Cyanide of potassium, 98 per cent pure	1 ounce
Sulphuric acid (sp. gr. 1.53)	2 ounces
Water	4 ounces

Place the required amount of water in an earthenware vessel, add the sulphuric acid slowly so as to avoid splashing and drop in the cyanide, broken in small lumps inclosed in a paper bag. Then get out and close the door tightly.

This is the most poisonous kind of combination and is absolute death to animal life, from man to mosquitoes. It will penetrate all corners and kill rats, mice, roaches and all kinds of creeping things, but it will not injure metals or fabrics of any kind. If this material is to be used it should be done with a full knowledge of its character, and the cellars to be treated should be made as tight as possible that the gas may not escape into the rooms above. One hour will be quite long enough to secure a maximum effect, and if a door or window is then opened from the outside a few minutes will serve to dilute the gas so that the place may be entered safely. This treatment is best adapted for large places, such as churches, schools and factories and public buildings, where the building may be fumigated when the building is unoccupied. By dropping the cyanide into the diluted acid in a paper bag the formation of the gas is delayed long enough to allow the operator to get out safely.

HOW TO FUMIGATE CELLARS.

Such fumigation as is used by the boards of health in case of contagious diseases will answer as well, but it is more expensive, requires a special outfit and one accustomed to its use. Burning formaldehyde candles will not answer, the insects drop to the ground stupified, but revive in a short time after fresh air is admitted, none the worse for their experience.

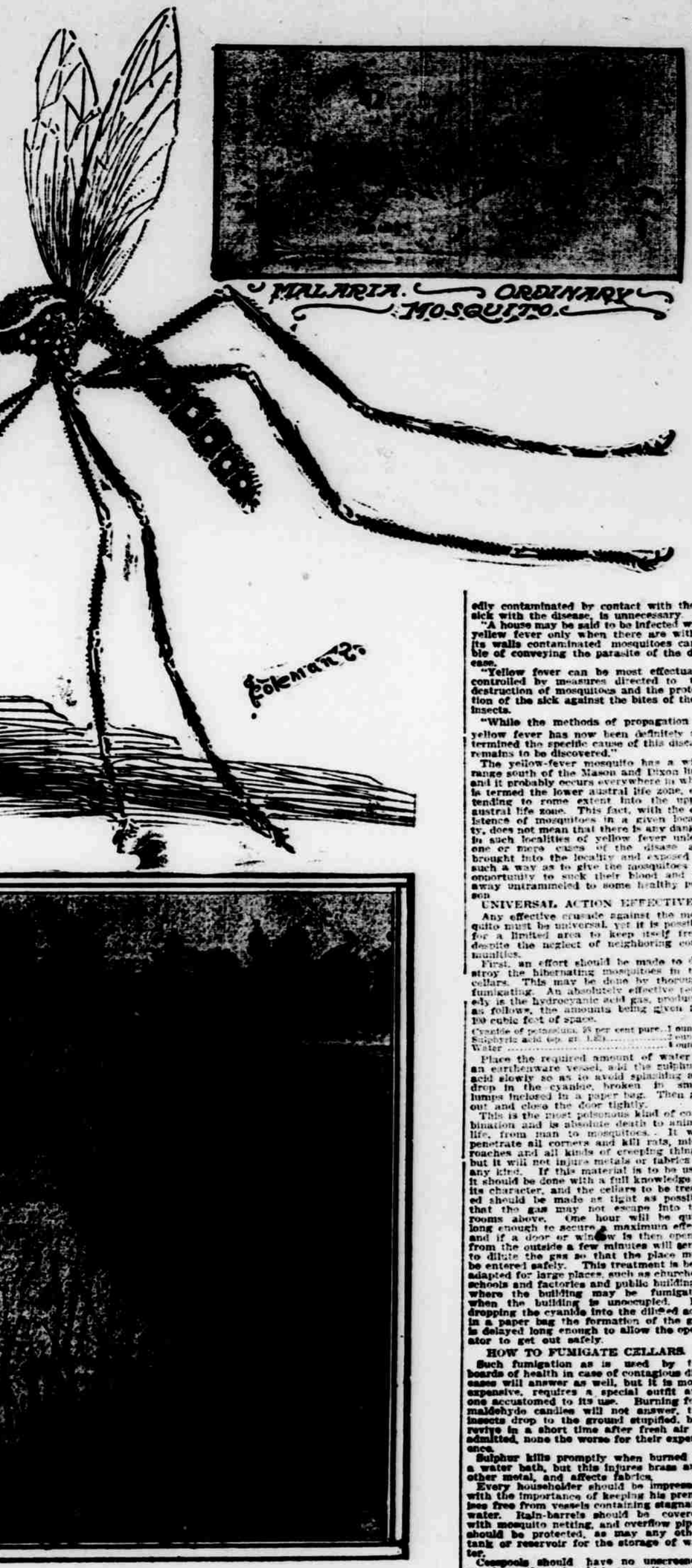
Sulphur kills promptly when burned in a water bath, but this injures brass and other metal, and affects fabrics.

Every householder should be impressed with the importance of keeping his premises free from vessels containing stagnant water. Rain-barrels should be covered with mosquito netting, and overflow pipes should be protected, as may any other tank or reservoir for the storage of water.

Cesspools should have no unscreened openings, through which mosquitoes can enter, and ventilating pipes to traps should have wire netting. Pools in lots or dumps or in the yards in which wigglers are found should be sprayed with oil. The oil forms a film which is fatal to the larvae and pupae, which come in contact with it on the surface of the water. One ounce, if sprayed with a syringe, will cover fifteen square feet of water.

The individual should protect the house with screens, and prevent any stagnant water about the premises.

In localities where the house mosquito is the only one to be dealt with, almost complete exemption can be secured with local work, and this becomes easier each year, as the removal of breeding places lessens their number and confines them to points where they can be treated.



A stagnant pool just east of the Wabash Railroad and north of Delmar avenue. Common mosquitoes breed by millions in places like this.

LINGUISTS NEEDED IN BUSINESS

Use of Foreign Languages for Commercial Purposes a Matter of Great and Increasing Importance.

The use of the foreign languages for commercial purposes is a matter of great and increasing importance, as the growth of foreign trade from the United States promises a large, new field for them. The services of a young man or woman commanding one or more of these languages are of distinct value in an exporting house. The young woman may soon become a well-paid foreign correspondent, while the young man soon rises to the management of the foreign department, and perhaps is sent to foreign countries as a trusted salesman or agent. Neither is this latter field closed to women, for there is one new traveller in Mexico for a Chicago house, who sells more silks and adhesives than any of the men they have on the road, and she began with only a limited knowledge of Spanish.

In the present state of foreign trade from Chicago, the Spanish is the leading language coming as it does with the trade from Cuba, Porto Rico and the West Indies, the Philippines, the South American countries and Mexico, and also from Spain. After the Spanish-American War there was a sharp interest in commercial Spanish, and this has resulted in the establishment of classes for instruction in that language for business purposes, both under private auspices and in the public schools.

The almost universal knowledge of French makes it the next available tongue for business correspondence. Just as French so frequently is the language of diplomacy, so it lends itself to the transaction of international business.

Closely ranking these languages in their order come German, Italian and Portuguese, and after them, as the leading foreign language in business correspondence come the Russian, Swedish and Norwegian, Dutch and Danish, Finnish, Polish, Bohemian, Hungarian, modern Greek, etc. Japanese and Chinese occasionally claim attention in one way or another, and once there was handed to me a letter in Cingalese. This had to be given up as untranslatable, and was respectfully referred to the British Consul, but in every other case (thanks to the cosmopolitan character of Chicago), I always have been able to find someone to take care of business matters in languages that I do not know personally.

In general the knowledge of a language for commercial uses is much short of the necessities of that language in a literary sense. The merely literary translator finds difficulty at first in the commercial use of the languages on account of the trade expressions and technical terms peculiar to each line of business. Yet in the letters from the foreign correspondent there are invitations to something more in correspondence than the average American letter writer is disposed to see. Almost invariably the foreigner of intelligence, in writing a business letter, puts into it a good deal more of formality and of politeness than does the American, at the same time putting more care into the penmanship and general appearance of the missive, many of their communications being remarkable for the neatness and beauty of their execution.

In the ordinary matter for the average correspondence the translator has opportunity beyond the mere stenographer to make a letter all that it should be. If a business man indite a letter in a short, brusque manner, the translator, who realizes that it will go to a person where the formalities of life count for a good deal, has the opportunity to soften the diction and round out the sentences where in detailed correspondence in English, the writer would insist upon his exact wording. In this manner the translator of foreign language requires a good deal more in equipment than does the shorthand letter writer.

Few people appreciate the necessity for the use of the languages in dozens of lines of trades in Chicago and the surrounding country. I often wish that I could follow to their destination the letters that leave my hands here. In every capital city of the world I should see the names of leading firms as familiar to me as are any in Chicago, and in every country I should find the people using Chicago machinery of every description and other Chicago products in endless variety.

This shows to what an extent our foreign trade has grown, but manifestly none of these goods from the Chicago factory get into the antipodes by mere force of gravitation. Not even the direction accredited to the course of empire accounts for the fact. Business methods in business languages are the outriders of this foreign trade, and the necessity for linguists in handling it comes of the fact that foreigners generally insist upon writing letters in their own tongue and upon receiving replies that require no interpreter. They frequently live in small provincial towns or out-of-the-way places, far removed from anyone speaking the English tongue, so that translation is impossible, and letters in English are often returned to the senders with the notice that in order to do business with these correspondents letters must be in their own language.

VARIETY GIVES WORK INTEREST.

The variety of the lines to be handled in general translation makes the work interesting, besides which there is the fascination of handling matter coming from all parts of the world. In a range of correspondence, taking in everything from the small articles sold by a mail-order house to the most important machinery installations, there is a constant change of subjects that keeps the interest alive. To understand what is wanted in many cases, however, it requires not only knowledge of the language involved, but experience in the work and a natural keen intuition for making out obscure meanings and strange penmanship. Local usage varies also as to the names given to some things in the various countries speaking the same language, so that the same thing is not always called by the same name, and the correspondent, not always knowing the exact technical name of what he wants, gives it the best one he can think of, which often keeps one "guessing" at what he means.

Our foreign relations, already so extensive, will go on increasing from year to year, and there will be a growing demand for translators in this connection, so that a good field is open to both young men and women, who to linguistic ability add the business qualifications necessary to success in this line.

Sleeper's Fatal Fall.

REPUBLIC SPECIAL.

New York, Aug. 5.—While walking in his sleep Joseph Laborn, living on the fourth floor at No. 156 Leonard street, near Mulberry Bend Park, fell out of a window in his flat early in the morning and received fatal injuries. His skull was fractured, both his arms and one leg broken, and he suffered internal injuries.